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## Dispositional optimism in adolescents with cancer: Differential associations of optimism and pessimism with positive and negative aspects of well-being

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**Objectives.** Dispositional optimism is often considered to be a unidimensional construct. Recent studies suggest, however, that optimism and pessimism are separate dimensions. In this study we investigated two issues. First, the levels of optimism and pessimism in adolescents with cancer compared with healthy controls and second, the individual effects of optimism and pessimism on concurrent and longitudinal well-being.

**Design.** A matched case-control design was used to examine whether adolescents with cancer and healthy adolescents differed with regard to optimism and pessimism. The second part of the study was employed in a prospective design with assessments in the patient group at 3 and 6 months post-diagnosis.

**Methods.** Thirty-three adolescents with cancer (3 months post-diagnosis) and 66 matched controls completed a measure on dispositional optimism (i.e., optimism and pessimism). In addition, patients completed measures on positive and negative aspects of well-being at 3 and 6 months post-diagnosis.

**Results.** Although adolescents with cancer were not more optimistic than their healthy peers, they were significantly less pessimistic. Zero order and semi-partial correlations showed that optimism and pessimism are related to different aspects of well-being. Specifically, we found a cohesive pattern in which optimism predicts positive aspects and pessimism negative aspects of well-being.

**Conclusions.** The high levels of overall optimism often found in patients with cancer might in fact result from low pessimism instead of high optimism. Furthermore, as our study shows that optimism and pessimism are differentially associated with aspects of well-being, it provides strong support for the bidimensionality of dispositional optimism.

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### Statement of contribution

**The level of dispositional optimism in adolescents with cancer compared to those of healthy controls**

**What is known on this subject?** Research shows that the level of dispositional optimism (DOP) in recently diagnosed cancer patients is relatively high.

**What does this study add?** The study provides more insight in the generally high levels of overall optimism often found in patients with cancer (i.e. high overall optimism reflects low pessimism instead of high optimism).

- Patients with cancer are *not* overly optimistic (high levels of DOP represent low pessimism instead of high optimism).
- It might be that low pessimism is a factor related to resiliency.

**The dimensionality of dispositional optimism (DOP): associations of optimism/pessimism with different aspects of well-being**

**What is known on this subject?** There is controversy in the literature about the dimensionality of dispositional optimism (DOP). Most studies in the field of oncology have examined DOP as an unidimensional construct. There is also research showing that optimism and pessimism are relatively separate dimensions.

**What does this study add?** By showing that optimism and pessimism are related to different aspects of well-being (both concurrently and prospectively), the study provides further support for the bidimensionality of DOP in adolescents with cancer.

- Further evidence for the bi-dimensionality of DOP highlights the need for separate assessed optimism/pessimism.
- Interventions should focus on changing patient's negative cognitions, rather than promoting optimism.

People differ in their expectations regarding the future. Some people, for instance, are characterized by the general belief that things will work out well for them. In a given situation they expect good things to happen, and when things do go wrong they expect the best possible outcome from a given situation. Others, however, confront the future with a state of mind in which they expect the worst. In the literature, these individual differences in expecting good versus bad things to occur has been referred to as dispositional optimism (Scheier & Carver, 1985).

The concept of dispositional optimism was originally conceptualized as a bipolar, unidimensional construct with optimism at one end and pessimism at the other (Scheier & Carver, 1985). As a consequence, a person will be categorized as being either an optimist or a pessimist but not both. However, some researchers have suggested that optimism and pessimism can in fact co-occur in the same person (Chang, D'Zurilla, & Maydeu-Olivares, 1994; Peterson, 2000). Factor analytic studies of versions of the most common measure for the assessment of dispositional optimism (Life Orientation Test [LOT], Scheier & Carver, 1985) provided evidence for a bidimensional solution with optimism and pessimism as related but distinct constructs (Ey *et al.*, 2005; Herzberg, Glaesmer, & Hoyer, 2006; Marshall, Wortman, Kusulas, Hervig, & Vickers, 1992; Robinson-Whelen, Kim, MacCallum, & Kiecolt-Glaser, 1997). More support for a bidimensional model of dispositional optimism can be found in validation studies, which reported that optimism and pessimism were differentially related to external variables (Chang, Maydeu-Olivares,

& D'Zurilla, 1997; Chang & Sanna, 2001; Marshall *et al.*, 1992; Mroczek, Spiro, Aldwin, Ozer, & Bosse, 1993).

The present study sets out to explore the bidimensional model in the context of paediatric oncology. To date, only two studies have examined dispositional optimism in children with cancer (Mannix, Feldman, & Moody, 2009; Williams, Davis, Hancock, & Phipps, 2010), and just one of them (Williams *et al.*, 2010) has measured optimism and pessimism separately. More knowledge about the separate effects of optimism/pessimism may contribute to a better comprehension of the beneficial or detrimental effect of both optimism and pessimism in patients with cancer. Besides that, it may enhance clinicians understanding of the patient group and assist in the development of appropriate interventions.

### **Optimism and pessimism in adolescents with cancer compared with healthy controls**

Dispositional optimism has been documented in the literature as an important psychological resource for patients with cancer (e.g., De Moor *et al.*, 2006; Gustavsson-Lilius, Julkunen, & Hietanen, 2007; Kurtz, Kurtz, Given, & Given, 2008). The first aim of the study is therefore to explore the level of dispositional optimism in adolescents with cancer. Evidence from the field of adult oncology has shown that adults recently diagnosed with cancer generally report higher levels of overall optimism than healthy controls (Pinquart, Frolich, & Silbereisen, 2007a; Schou, Ekeberg, Sandvik, & Ruland, 2005; Stiegelis *et al.*, 2003). This might indicate that patients newly diagnosed with cancer are somewhat overly positive. However, as the overall optimism score is a composition of both optimism and pessimism, we cannot be sure that this interpretation is correct. Other explanations for the relatively high overall score could be that the patients are less pessimistic, or even that the high overall score reflects a combination of higher optimism and lower pessimism. In this study we will address this issue by complementing the measure of overall optimism with separate assessed optimism and pessimism. By comparing overall optimism, optimism, and pessimism in adolescents with and without cancer, we not only aim to replicate the findings from prior research but also hope to give an answer to the question of whether the notion of overly optimistic patients with cancer holds true or not.

### **Differential associations of optimism and pessimism with aspects of well-being**

The second aim of this study is to look in more detail at the relationship between optimism/pessimism and well-being. Evidence for the beneficial effects of dispositional optimism on the well-being of patients with cancer can be found in several studies (e.g., Allison, Guichard, & Gilain, 2000; Friedman *et al.*, 2006; Lynch, Steginga, Hawkes, Pakenham, & Dunn, 2008; Mannix *et al.*, 2009). However, because few studies have examined optimism and pessimism separately, it is not possible to answer the question whether it is more important for a person's well-being to be high in optimism, low in pessimism or both.

Some of the studies in the field of oncology that have measured optimism and pessimism separately are difficult to interpret because of multicollinearity among the optimism and pessimism scales was not corrected. The studies that did contain this correction suggested that optimism and pessimism are related to different aspects of well-being. For example, the study by Williams *et al.* (2010) among adolescents with and without cancer found that optimism and pessimism were differentially associated with emotional and behavioural health-related quality of life outcomes. Furthermore,

other research suggests that pessimism is a more important predictor of well-being of patients with cancer than optimism. In a recent study among female patients with cancer, pessimism, and not optimism, was predictive of anxiety, depression, and quality of life (Zenger, Glaesmer, Hockel, & Hinz, 2011). Socală and Tătar (2010) found that symptoms of depression, anxiety, and negative mood regulation expectancies in patients with breast or cervical cancer were predicted by pessimism and not by optimism. Although Pinquart, Frolich, & Silbereisen (2007b) found both optimism and pessimism to be associated with concurrently assessed affect balance in patients recently diagnosed with cancer; only pessimism predicted a negative change in affect balance during the 9 months follow-up.

The question arises as to why optimism failed to predict well-being in patients with cancer. Our reading of the literature on well-being (Clark & Watson, 1991; Diener, Suh, Lucas, & Smith, 1999; Karademas, 2007) and of studies relating optimism and pessimism to higher order personality constructs (Chang *et al.*, 1997; Williams, 1992) gave us reason to believe that optimism and pessimism are possibly related to different states of well-being: Optimism to positive states and pessimism to negative states. Although well-being encompasses a broad category of both positive and negative states, most studies in the field of psycho-oncology have thus far focused mainly on the negative aspects of well-being. The absence of studies on positive aspects of well-being might explain optimism's lack of predictive value. Therefore, in this study we will test whether optimism and pessimism are differently related to positive and negative aspects of well-being.

### **The present study**

In sum, in the present study we will examine the following research questions:

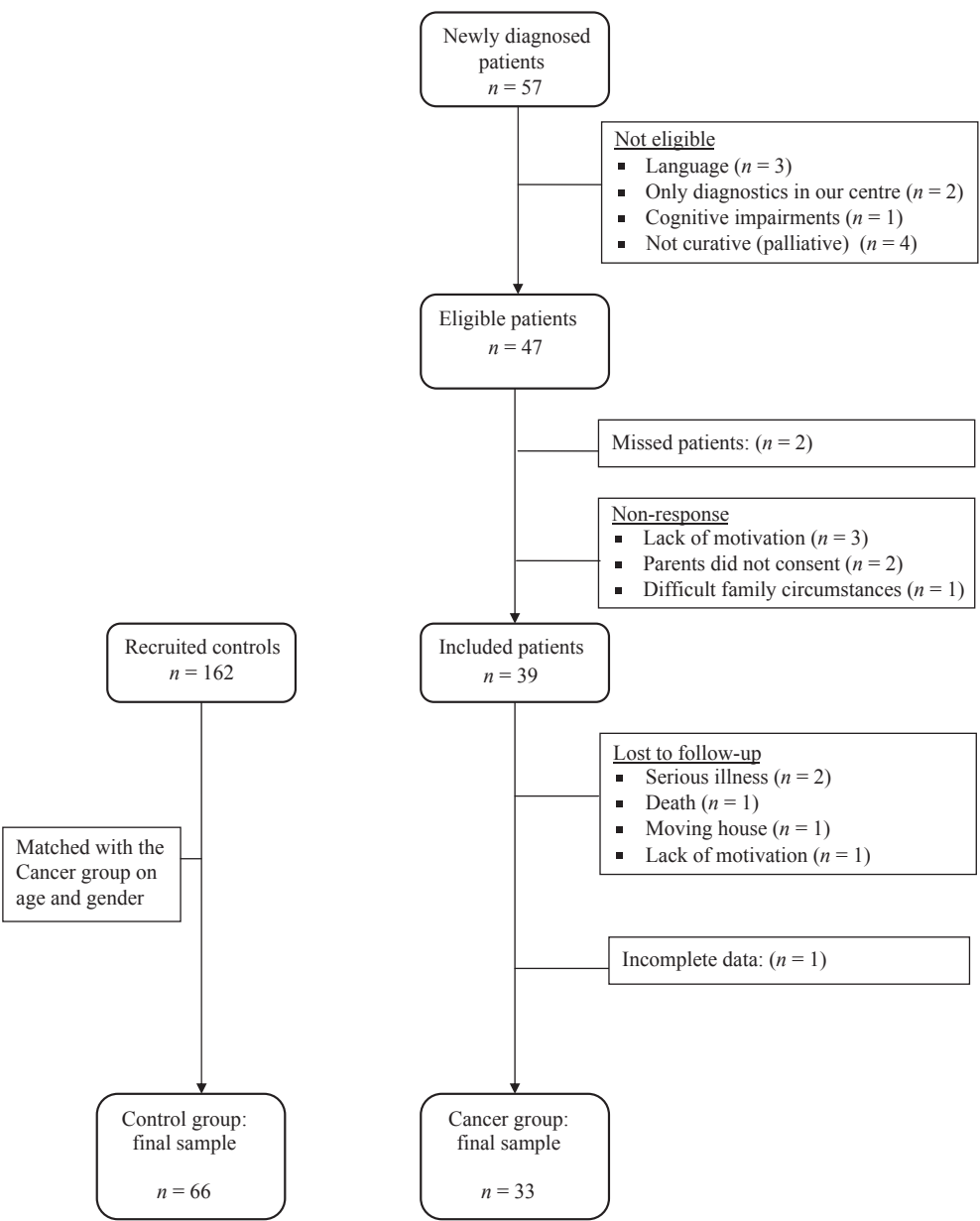
1. Do adolescents with cancer differ from healthy controls with regard to mean levels of overall optimism, optimism, and pessimism? On the basis of the findings in the adult literature, we expect that adolescents with cancer will exhibit higher levels of overall optimism. By separately assessing optimism and pessimism, we aim to answer the question whether high overall optimism reflects high optimism, low pessimism or both.
2. Are optimism and pessimism differentially associated with concurrently assessed positive and negative aspects of well-being? On the basis of prior research, we expect that optimism is associated with positive aspects and pessimism with negative aspects of well-being.
3. Are optimism and pessimism differentially associated with longitudinally assessed positive and negative aspects of well-being? In other words, is it possible to replicate the possible pattern of differential associations of optimism and pessimism with aspects of well-being in the follow-up?

## **Method**

### **Participants**

The present study is part of a longitudinal research project on psychological adaptation to childhood cancer. Eligible participants for this project were paediatric patients who were newly diagnosed with cancer in the paediatric oncology unit of a large University Medical Centre in the Netherlands between September 2007 and December 2009. Patients

undergoing palliative treatment, patients with a prior diagnosis of cancer, patients with cognitive impairments, and patients who were unable to understand the Dutch language were excluded from the study. For this study, only the data pertaining to adolescents were used. We also collected data from a control group of healthy adolescents. The data of the control group were only used for the first research question. Figure 1 shows a flow chart of the study participants.



**Figure 1.** Flow chart of participants.

The final sample in the cancer group consisted of 33 adolescents. Informed consent was obtained from 39 patients (response rate 83%), but six patients were lost to follow-up. The participants in the cancer group ranged in age between 12 and 18 years ( $M = 14.2$ ,  $SD = 1.63$ , median = 14), and 19 (58%) were female adolescents. Seventeen participants (51.5%) reported to pursue vocational education and 16 (48.5%) higher secondary education. With regard to the medical characteristics of the sample, 13 participants (39%) were diagnosed with a haematological malignancy, 14 participants (43%) with a solid tumour, and six participants (18%) with a brain tumour. Treatment modalities included: Chemotherapy alone 33% ( $n = 11$ ), surgery alone 9% ( $n = 3$ ), and a combination of treatment modalities 58% ( $n = 19$ ). Most patients (88%,  $n = 29$ ) were receiving treatment at the first assessment period. The percentage on treatment at the second assessment point (6 months post-diagnosis) was 64% ( $n = 21$ ).

Adolescents in the control group ( $n = 66$ ) were selected from a larger dataset ( $n = 162$ ) that was collected at four high schools in the Netherlands. The control group was matched to the patients (ratio 2:1) on the basis of age and gender. The control group did not differ significantly from the patient group with regard to educational track ( $\chi^2(1, N = 99) = 1.68, p = .196$ ). To take part in this study, control participants had to have a clean bill of health without a history of cancer or other life-threatening illnesses.

### Procedure

Approval of the Medical Ethics Committee was obtained in June 2007. Patients were informed about the study by the researcher, and those patients who gave informed consent received self-report questionnaires. Dispositional optimism was measured once at 3 months post-diagnosis. Data on positive and negative aspects of well-being were collected at, respectively, 3 and 6 months post-diagnosis. Participants in the control group were informed about the study by their teacher. Those willing to participate filled out a questionnaire about dispositional optimism, which they received during school hours.

### Measures

The following concepts were measured in the present study: Dispositional optimism, (i.e., overall optimism, optimism, and pessimism), life satisfaction, the absence and presence of anxiety, emotional functioning, physical functioning, and physical symptoms. The descriptive statistics of the study variables are presented in Table 1.

#### *Dispositional optimism*

Dispositional optimism was measured with the Youth Life Orientation Test (YLOT; Ey *et al.*, 2005). The YLOT is a 16-item self-report measure of generalized outcome expectancies, meant for 8- to 18-year olds. It consists of seven positively phrased items, seven negatively phrased items, and two filler items. Examples include 'I usually expect to have a good day', 'I am always hopeful about my future', 'Things usually go wrong for me', 'Each day I expect bad things to happen'. Responses were made on a 4-point scale, ranging from 1 (*not true for me*) to 4 (*true for me*). In this study, separate scores for optimism (sum of the positive items) and pessimism (sum of the negative items) were computed. To compare our results to those of other studies we also used the total optimism score (overall optimism), which is the sum of the positively phrased plus the (reversed) negatively



**Table 1.** Descriptive statistics of the study variables

Variable (score range)	Control group (n = 66)		Cancer group T1 (n = 33)		Cancer group T2 (n = 33)	
	$\alpha$	M (SD)	$\alpha$	M (SD)	$\alpha$	M (SD)
Overall optimism (14–56)	.90	40.44 (7.28)	.85	45.21 (6.78)		
Optimism (7–28)	.83	20.35 (3.77)	.80	21.12 (4.18)		
Pessimism (7–28)	.84	14.91 (3.99)	.82	10.94 (3.77)		
Life satisfaction (1–10)				7.49 (1.37)		7.52 (1.46)
STAI-C positive items (10–30)			.88	20.59 (3.43)	.92	20.86 (4.46)
STAI-C negative items (10–30)			.72	10.78 (1.41)	.61	10.46 (0.96)
Emotional functioning (0–100)			.85	81.40 (19.44)	.71	84.14 (15.70)
Physical functioning (0–100)			.91	56.84 (29.39)	.95	65.95 (26.67)
Physical Symptoms (0–11)			.73	3.82 (2.60)	.65	3.17 (2.21)

phrased questions. The scales are scored in such a way that higher scores reflect a higher level of that particular construct (i.e., optimism, pessimism or overall optimism).

#### *Life satisfaction*

Life satisfaction was measured by means of the Cantril Ladder (Kilpatrick & Cantril, 1960). The Cantril Ladder, also known as the Self-Anchoring Scale (CSAS), is a single item measure. The Cantril Ladder consists of 10 steps; with the bottom rung representing the worst possible life imagined (1) and the top rung of the ladder representing the best possible life (10). Participants were asked to rate their current position on this ladder.

#### *Absence and presence of anxiety*

The state scale of the State Trait Anxiety Inventory for Children (STAI-C; Spielberger, Edwards, Lushene, Montouri, & Platzek, 1973) was used to measure the presence and absence of transitory anxiety. The state scale of the STAI-C has 20 items: 10 positively phrased items and 10 negatively phrased items. Originally, the instrument was designed to measure state anxiety as a unidimensional construct (the sum of negatively phrased items plus the sum of the positively phrased items reversed). However, studies provided empirical support for a two factor model with the sum of the positively phrased items (anxiety is absent) and the sum of the negative phrased items (anxiety is present) as distinct dimensions (Dorr, 1981; Turgeon & Chartrand, 2003).

*STAI-C positive items.* Examples of STAI-C state positive items are ‘I am relaxed’, ‘I feel cheerful’, ‘I feel happy’. Answers were given on a 3-point scale and items were summed. Higher scores reflected a more positive state (i.e., absence of transitory anxiety).

*STAI-C negative items.* Examples of STAI-C state negative items include ‘I feel scared’, ‘I feel nervous’, ‘I feel bothered’. Again, answers were given on a 3-point scale and items were summed. Higher scores reflected a more negative state (i.e., presence of transitory anxiety).



*Emotional functioning*

Emotional functioning was measured using the emotional functioning subscale of the Pediatric Quality of Life Inventory (PedsQL) 4.0 Generic Core scale (Varni, Seid, & Kurtin, 2001). This subscale has five items, each expressing a negative emotional state (i.e., feeling afraid or scared, feeling down, feeling angry, having trouble sleeping, and being worried). Respondents indicated the extent to which each item posed a problem during the past week. Responses were made on a 5-point Likert scale, ranging from 0 (*never*) to 4 (*almost always*). Items were reverse scored and scaled to a range of 0–100, and subsequently summed. Higher scores represented better emotional functioning (i.e., less emotional problems).

*Physical functioning*

Physical functioning was measured with the physical functioning subscale of the PedsQL 4.0 Generic Core scale (Varni *et al.*, 2001). This subscale consists of eight items, each stating a physical impairment such as having difficulty running, lack of energy, and so forth. The adolescent was asked to what extent each item posed a problem during the past week. Responses were made on a 5-point Likert scale, ranging from 0 (*never*) to 4 (*almost always*). Items were reverse scored and scaled to a range of 0–100, and were subsequently summed. Higher scores represented better physical functioning (i.e., less physical problems).

*Physical symptoms*

Physical symptom prevalence was assessed using the physical subscale of the Memorial Symptom Assessment Scale (MSAS) 10–18 (Collins *et al.*, 2000). The physical subscale of the MSAS consists of 11 physical symptoms often experienced by children with cancer. The symptoms included were lack of appetite, lack of energy, pain, feeling drowsy, constipation, dry mouth, nausea, vomiting, changes in taste, weight loss, and dizziness. For each symptom, the patient had to indicate whether a symptom was present during the past week or not. Next, a total physical symptom prevalence score was computed by aggregating the prevalence scores of the 11 symptoms. Higher scores reflected more symptoms.

**Statistical analyses**

Only patients who participated in both examinations (T1, T2) were included in the statistical analyses. First, we checked if the assumptions of the parametric statistics were met. Then, we tested for possible confounders. Using the independent samples *t*-test, we found no significant effect of education on the three aspects of dispositional optimism (overall optimism, optimism, and pessimism). Next, the independent samples *t*-test was used to test whether overall optimism, optimism, and pessimism differed between the study groups (first research question). Zero order Pearson correlations were computed to assess the bivariate relationships between the study variables (second and third research questions). We found optimism and pessimism to be inversely related ( $r = -.44$ ). Semi-partial correlations were calculated to deal with this multicollinearity. The semi-partial correlations were generated by regressing optimism and pessimism on the six aspects of well-being.

# Results

## Optimism and pessimism in adolescents with cancer compared with healthy controls

The mean levels of overall optimism, optimism, and pessimism are presented in Table 1. Independent samples t-test results showed that adolescents with cancer reported significantly higher levels of overall optimism than healthy controls ( $t(97) = 3.14$ ,  $p = .002$ ,  $d = .64$ ). Separate analyses of the optimism and pessimism subscales, however, revealed that the pessimism score and not the optimism score accounted for the difference in the mean levels of overall optimism. Adolescents with cancer reported lower levels of pessimism ( $t(97) = -4.76$ ,  $p < .001$ ,  $d = .96$ ) than their healthy peers, but did not differ significantly with regard to their levels of optimism ( $t(97) = 0.93$ ,  $p = .356$ ,  $d = .18$ ).

## Differential associations of dispositional optimism with concurrently assessed aspects of well-being

Table 2 presents the correlations for optimism and pessimism (measured at T1), both with and without the variance associated with the alternative construct partialled out. To allow for a comparison between the separate optimism and pessimism scores and the overall optimism score, the overall optimism score is also included in the table. The results show that overall optimism is significantly moderately related to all concurrently assessed aspects of well-being, both positive and negative. Thus, higher overall optimism predicts greater life satisfaction, higher levels on the positive items of the STAIC, lower levels on the negative items of the STAIC, better physical and emotional functioning, and fewer symptoms. Inspection of the separate scores of optimism and pessimism, however, provides a much clearer picture of the relationship between dispositional optimism and well-being. The correlation pattern presented in Table 2, for example, reveals that optimism and pessimism are related to different aspects of well-being: Optimism is associated with positive outcomes, whereas pessimism is related to negative outcomes. In

**Table 2.** Zero order and partial correlations between optimism–pessimism and positive and negative aspects of well-being at 3 months post-diagnosis ( $n = 33$ )

	Dimension optimism T1		Dimension pessimism T1		Overall optimism T1
	<i>r</i>	Semi-partial <i>r</i>	<i>r</i>	Semi-partial <i>r</i>	<i>r</i>
Positive aspects of well-being T1					
Life satisfaction	.43*	.34*	-.28	-.10	.45*
STAIC positive items	.62**	.52**	-.34	-.06	.56**
Negative aspects of well-being T1					
STAIC negative items	-.15	.13	.58**	.58**	-.44*
Emotional functioning <sup>a</sup>	.20	-.06	-.55**	-.52**	.46*
Physical functioning <sup>b</sup>	-.03	-.11	-.16	-.19	.38*
Physical symptoms	-.30	-.18	.31	.19	-.36*

Notes. <sup>a</sup>Lower scores reflect more emotional problems.

<sup>b</sup>Lower scores reflect more physical problems.

\* $p < 0.05$ ; \*\* $p < 0.01$ .

**Table 3.** Zero order and partial correlations between optimism–pessimism and positive and negative aspects of well-being at 6 months post-diagnosis ( $n = 33$ )

	Dimension optimism T1		Dimension pessimism T1		Overall optimism T1
	<i>r</i>	Semi-partial <i>r</i>	<i>r</i>	Semi-partial <i>r</i>	<i>r</i>
Positive aspects of well-being T2					
Life satisfaction	.30	.20	-.28	-.19	.43 <sup>†</sup>
STAIC positive items	.43 <sup>†</sup>	.36 <sup>†</sup>	-.25	-.09	.47*
Negative aspects of well-being T2					
STAIC negative items	-.27	-.08	.52**	.45*	-.48*
Emotional functioning <sup>a</sup>	.08	-.10	-.47*	-.47*	.32
Physical functioning <sup>b</sup>	.20	.06	-.39*	-.34 <sup>†</sup>	.31
Physical symptoms	-.23	-.01	.51**	.46*	-.42*

Notes. <sup>a</sup>Lower scores reflect more emotional problems.

<sup>b</sup>Lower scores reflect more physical problems.

<sup>†</sup> $p < 0.10$ ; \* $p < 0.05$ ; \*\* $p < 0.01$ .

other words, higher optimism scores and not lower pessimism scores are predictive of higher scores on the positive outcomes, whereas higher negative outcomes are primarily predicted by higher pessimism scores and not by lower optimism scores. To summarize, the results presented in Table 2 reveal a cohesive pattern of differential associations of optimism and pessimism with aspects of well-being. When the overall score alone is reported, important information will be lost (e.g., a moderately positive correlation with pessimism and no correlation with optimism).

#### ***Differential associations of dispositional optimism (overall optimism, optimism, and pessimism assessed at T1) with aspects of well-being assessed during follow-up (measured at T2)***

The results of the longitudinal relationships between dispositional optimism (overall optimism, optimism, and pessimism) and well-being are presented in Table 3. The results show that higher overall optimism measured at T1 is associated with better well-being at T2. However, at this assessment point not all correlations are significant. Overall optimism is not significantly associated with life satisfaction and emotional- and physical functioning. The differential pattern of associations of optimism and pessimism with respect to the aspects of well-being is partially replicated. Higher pessimism is significantly associated with higher scores on the negative items of the STAIC, less emotional functioning and with higher levels of symptom report. Optimism does not predict these outcomes. Again, the positive aspects of well-being are predicted by optimism and not pessimism. However, in the longitudinal analyses these relationships are no longer significant.

## **Discussion**

The objective of the present study was to provide an application and further exploration of the bidimensional structure of dispositional optimism in the context of paediatric

oncology. First, we tested whether adolescents with cancer differed from healthy controls with regard to overall optimism, optimism, and pessimism. Our results show that although adolescents with cancer reported higher levels of overall optimism, they were not more optimistic than their healthy peers. The higher levels of overall optimism in the cancer group must therefore be understood from their pessimism scores, which were significantly lower than those of the control group. Second, to cross-validate the bidimensional structure of dispositional optimism found in prior research, we tested the differential associations of optimism and pessimism with aspects of well-being. Our findings show that optimism was related to positive aspects of well-being and pessimism to negative aspects of well-being.

Our study replicates earlier research which found that adolescents with cancer report relatively high levels of overall optimism (Mannix *et al.*, 2009). Our findings regarding the subscales of optimism and pessimism resemble the findings of two recent studies on adults with cancer (Zenger, Brix, Borowski, Stolzenburg, & Hinz, 2010; Zenger *et al.*, 2011), which show that high overall optimism reflects low pessimism and not high optimism. These findings contradict the commonly held belief that patients with cancer have an overly positive outlook on life. Surprisingly, our findings did contrast partly with those of Williams *et al.* (2010). Their large study among children with cancer (i.e., both in and off treatment) and healthy controls found no differences in mean levels of pessimism between cancer patients and controls. Inconsistency of our results with those of Williams *et al.* (2010) may be due to differences in sample size, a different age range of the study participants (i.e., 7–18 vs. 12–18 years of age), and variability with regard to time since diagnosis.

Why do the adolescents with cancer in our study differ from healthy controls with regard to pessimism, and not with regard to optimism? It is possible that the items on the optimism and pessimism scales arouse different mental associations (i.e., are evaluated in light of different timeframes and contexts [Benyamini, 2005, p. 1470]). For instance, adolescents with cancer might have a more global, less illness related context in mind when they rate the optimistic items (e.g., Overall, 'I expect more good things to happen to me than bad things') than the pessimistic items (e.g., 'Each day I expect bad things to happen'). Although this interpretation sounds plausible, for a better understanding of this issue further research is required. Our results could also be understood in the context of repressive coping. Repressive coping applies to persons who use an avoidant style of negative information processing (Weinberger, 1979). Repressive coping is often found in the paediatric cancer population (Phipps & Srivastava, 1997; Phipps, Steele, Hall, & Leigh, 2001). Prior research (Myers & Steed, 1999) has shown that repressors score lower than controls on pessimism, but tend to overlap on optimism.

Our findings that optimism predicts positive aspects and pessimism negative aspects of well-being provide further support for the bidimensionality of dispositional optimism. The findings can be understood in light of previous research which showed how optimism and pessimism are embedded in a network of other concepts, including broader personality constructs and mood (Marshall *et al.*, 1992; Mroczek *et al.*, 1993; Williams, 1992). The association of optimism and pessimism with these underlying constructs may explain the direct and indirect links (via appraisal, coping, and attentive processes) of optimism and pessimism with aspects of well-being. For example, the association of pessimism with neuroticism and trait negative affect might explain why adolescents who score high on pessimism report more problems, demonstrate increased anxiety, and have higher symptom levels. On the other hand, the association of optimism with extraversion and trait positive affect may explain why the adolescents who score high on optimism

experience more happiness, contentment, and satisfaction with life. The link between optimism and positive states may be also understood from research which shows that higher optimism is related to less threat appraisal (Schou, Ekeberg, & Ruland, 2005), more adequate coping (Solberg Nes & Segerstrom, 2006), and a relatively broad attention scope (Segerstrom, 2001).

Interestingly, optimism failed to predict well-being in the follow-up. This finding coincides with previous research among adult cancer patients (Pinquart, Frolich, & Silbereisen 2007b). The ability of persons who score high on optimism to expect the best possible outcome of a given situation might help them deal with the overwhelming events around the diagnosis. Another characteristic of persons who score high on optimism is that they not only tend to focus on the negative (e.g., averse treatments and side effects) but also on the positive (e.g., getting attention, receiving perks, the alternation of feeling ill and feeling better) aspects of a situation (Segerstrom, 2001). This might help them to experience positive states. Nevertheless, experience in our own clinical setting gives us reason to believe that over time patients habituate to the situation, and many of them gradually re-open their awareness to other aspects of life, such as school and social contacts. Therefore, not only patients high in optimism but also other patients may discover that during cancer treatment negative and positive experiences co-occur and intertwine. This may explain why optimism explained limited variance in well-being during the follow-up. In contrast, future well-being was predicted by pessimism. There are several explanations for this relationship. First of all, evidence has shown that optimism and pessimism are related to different coping strategies (e.g., optimism relates to engagement coping, pessimism to disengagement coping; Scheier, Weintraub, & Carver, 1986; Solberg Nes & Segerstrom, 2006). So it might be that, because of their tendency to disengage from stressful situations (e.g., side effects of treatment), persons high in pessimism do little to improve their situation. As a result, problems remain unsolved and negative self-fulfilling prophesies may arise, such as reduced functional recovery due to lack of physical exercise. Second, due to the conceptual overlap between pessimism and neuroticism (e.g., Scheier, 1994, Benyamini 2008) people high in pessimism may be more inclined than those low in pessimism to a negative interpretation of their situation. This might have coloured their self-reports. Furthermore, evidence showing a positive relationship between pessimism and anticipatory distress (e.g., Sohl *et al.*, 2012) suggests that individuals high in pessimism tend to preoccupy themselves with future events that might go wrong (e.g., continuation of the side effects of the treatment in the future, cancer relapse).

Our findings should be considered in light of study strengths and limitations. An important strength of the study was our sample. Thus far most research regarding the dimensionality of dispositional optimism has been carried out with healthy persons. Future expectancies (i.e., optimism and pessimism), however, may have a different meaning for people confronting a life-threatening disease than for healthy people. Therefore, expanding the exploration of the bidimensional structure of dispositional optimism to such contexts provides additional knowledge about the construct. Another positive aspect was the homogeneity of our sample with regard to the time elapsed since diagnosis. This is an important methodological strength regarding the fact that evidence in the field of paediatric psycho-oncology is often based on samples with a wide range of time since diagnosis (i.e., sometimes ranging from 1 month post-diagnosis to several years thereafter). Furthermore, the longitudinal design and the inclusion of both positive and negative aspects of well-being made it possible to get more insight in the differential pattern of associations of optimism and pessimism with well-being.

The present study also has some limitations. First, our study measured a limited number of positive outcomes. Future research should include other aspects of positive well-being (e.g., positive affect, happiness, purpose in life). Second, due to our limited sample size a cross-validation could not be carried out. Third, notwithstanding the homogeneity of the sample with regard to age and time since diagnoses, heterogeneity with regard to other factors, such as diagnosis and other medical factors may have influenced our results. Unfortunately, due to our small sample size, the effect of these variables could not be fully explored. Lastly, we measured optimism and pessimism only once. Despite the fact that dispositional optimism is considered to be a relatively stable trait, the literature is inconsistent as to whether the construct might change during cancer treatment or not. Both stability (Schou, Ekeberg, Sandvik *et al.*, 2005) and change (Pinquart, Frolich, & Silbereisen, 2007a; Schofield *et al.*, 2004) of dispositional optimism in cancer patients have been observed in prior research. Therefore, for a more accurate prediction of future well-being, follow-up assessments of optimism and pessimism should be included in future research.

Nevertheless, despite these limitations, our study may have important implications for both theory and practice. Our finding that adolescents with cancer were not more optimistic, but rather less pessimistic than their healthy peers takes us a step forward in our understanding of the relative good outcomes often found in this population. Furthermore, the finding that optimism and pessimism are differentially associated with aspects of well-being strongly supports the bidimensionality of dispositional optimism. The study demonstrates that meaningful information will be lost when a unidimensional assessment of dispositional optimism is used.

With respect to the clinical importance of our study, our findings may enhance clinicians' understanding of the patient group (i.e., low pessimism as an explanatory factor for the relatively good psychosocial outcomes in this population). Another implication of this study is that separate assessed optimism and pessimism predict patients' well-being better than overall dispositional optimism. Specifically, separately assessed optimism and pessimism not only provides a tool to identify the patients who are at risk but also offers a direction for clinical practice. Interventions aimed at changing patients' well-being should be targeted at the modification of patients' negative cognitions, rather than concentrating on actions that promote optimism. This in turn may help them to cope better with the disease and treatment and foster adaptation.

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